

III. AMENDMENTS TO THE DRAWINGS:

The attached sheet of drawings includes changes to FIG. 5. This sheet, which includes FIGS. 5 and 6, replaces the original sheet including FIGS. 5 and 6. In FIG. 5, the reference characters “1a” and “1b” have been added.

Attachment: One Replacement Sheet

One Annotated Sheet

IV. REMARKS

The specification has been amended to address minor typographical and grammatical errors. The specification has also been amended to incorporate subject matter from original Figures 4 and 5, namely, that the sensor part 1 includes outer peripheral part 1a, which forms the sensor part 1 of the corrosion resistant metal material W with thickness of 120~180 μ m (or a heat resistant metal substrate 2), and central part 1b, which is made to be a thin plate with thickness of approximately 30~80 μ m, as described later, by removing a part of the rear face side of the material W by the method of an electrolytic etching processing (See Fig. 5). The specification has also been amended to incorporate subject matter from Figure 5 wherein the circle-shaped sensor part 1 separated from the material W is fitted flush into the flat fitting groove 13a of the sensor base 13 formed in the shape shown in Figure 5, and fixed hermetically to the sensor base 13 by laser welding on the outer peripheral part 1a. The specification has also been amended to include two new character references, “ 1a” and “ 1b,” in accordance with amendments made to the drawings.

Figure 5 has been amended to designate the “ outer peripheral part” of sensor part 1 as “ 1a” and to designate the “ central part” of the sensor part 1 as “ 1b.”

Claim 1 has been amended to incorporate the subject matter of claims 4 and 5, and to additionally recite “wherein the corrosion resisting metal substrate comprises an outer peripheral part and a central part, wherein the central part comprises a thin plate that has a

thickness that is less than the thickness of the outer peripheral part” as supported by Figure 5, and on page 12, lines 8-17, of Applicants’ disclosure as originally filed.

Claim 2 has been amended to recite “wherein the sensor part fits into the body” as supported on page 22, lines 7-10, of Applicants’ specification as originally filed. Claims 10 and 16 have been amended to depend on new claim 17. Claim 15 has been amended to depend on claim 10.

New claim 17 corresponds to the combined subject matter of original claims 1 and 2 rewritten in independent form, and additionally recites “wherein the sensor part fits into the body” as supported on page 22, lines 7-10, of Applicants’ specification as originally filed.

New claim 18 depends upon claim 1, and further recites “wherein the insulation film is an oxidized film with a thickness of 1.2 μm to 1.8 μm ” as supported on page 14, lines 6-9, of Applicants’ specification as originally filed.

New claim 19 depends upon claim 1, and further recites “wherein the temperature sensor comprises a plurality of temperature detecting resistances formed by the metal film comprising a Cr/Pt/Cr film” as supported on page 14, lines 10-16, and on page 16, lines 5-9, of Applicants’ specification as originally filed. New claim 20 depends upon claim 19, and further recites “wherein the heater is formed by a metal film comprising a Cr/Pt/Cr film” as supported on page 14, lines 10-16, of Applicants’ specification as originally filed.

New claim 21 depends upon claim 1, and further recites “wherein the protection film is a SiO_2 film that is 0.4 μm to 0.7 μm thick” as supported on page 14, lines 17-20, of Applicants’ specification as originally filed. New claim 22 depends upon claim 1, and further recites “wherein the outer peripheral part of the sensor part is fixed into a flat fitting groove on a bottom surface of the sensor base” as supported by Figure 5 and on page 17, line 22, to page 18, line 4, of Applicants’ disclosure as originally filed.

No new matter has been added to the above-captioned application by the present amendment.

A. The Invention

The present invention pertains broadly to a corrosion resistant metal made thermal type mass flow rate sensor such as may be employed to detect a mass flow rate in a gas supply line, and the like, in a semiconductor manufacturing facility. In accordance with an embodiment of the present invention, a corrosion resistant metal made thermal type mass flow rate sensor is provided that includes the features recited by independent claim 1. In accordance with another embodiment of the present invention, a corrosion resistant metal made thermal type mass flow rate sensor is provided that includes the features recited by independent claim 17. Various other embodiments, in accordance with the present invention, are recited by the dependent claims.

An advantage achieved by the various embodiments of the present invention is that a corrosion resistant metal made thermal type mass flow rate sensor is provided that permits manufacture of ultra-small-sized products that operate in a consistent manner without a lot of product-to-product variability. Another advantage achieved by the various embodiments of the present invention is that a thermal type mass flow rate sensor is provided that is corrosion resistant, has a fast response speed, and that does not emit particles or suffer the occurrence of outside leaks.

Certain additional advantages are achieved according to certain claimed embodiments of the present invention. For example, by making the structure shown in Figure 5 of Applicants' disclosure, it becomes easier to mount sensor S to a fluid supply device. As another example, when sensor S is mounted to a fluid supply device, as shown in Figure 15,

strain caused in the sensor part (1) is completely eliminated so that high precision measurement is achieved.

B. The Rejections

Claims 1, 3, 5, 9, 11, 14 and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Inushima et al. (U.S. Patent 6,550,325, hereafter, the “Inushima Patent”) in view of Nagata et al. (U.S. Patent 5,291,781, hereafter the “Nagata Patent”). Claims 2, 4, 6-8, 10, 12, 13 and 15 stand rejected under 35 U.S.C. 103(a) as unpatentable over the Inushima Patent in view of the Nagata Patent, and further in view of Azima (U.S. Patent 6,062,077, hereafter the “Azima Patent”).

Applicants respectfully traverse the Examiner’s rejection and request reconsideration of the above-captioned application for the following reasons.

C. Applicants’ Arguments

A prima facie case of obviousness requires a showing that the scope and content of the prior art teaches each and every element of the claimed invention, and that the prior art provides some teaching, suggestion or motivation to combine the references to produce the claimed invention. In re Oetiker, 24 U.S.P.Q.2d 1443 (Fed. Cir. 1992); In re Vaeck, 20 U.S.P.Q.2d 1438 (Fed Cir. 1991). In this case, the Examiner has failed to establish a prima facie case of obviousness against claims 1-3, 6, 7, 10 and 13-22 because the combination of the Inushima Patent, Nagata Patent, and the Azima Patent still fails to teach, or suggest, all of the subject matter of these claims.

i. The Inushima Patent

The Inushima Patent discloses an “electric device and method of driving the same,” which involves forming a thermistor layer made of platinum on a thin diamond film so that the amount of heat carried away from the diamond film by a fluid is detected as a change in the temperature of the thermistor layer (See Abstract of the Inushima Patent). The Inushima Patent further discloses that the rear side of the diamond film is kept in contact with the fluid to prevent the material of the thermistor from being corroded by the fluid, and that, in accordance with another embodiment of the electric device, a heating element and a thermistor are formed on one surface of the thin diamond film while the other surface is kept in contact with the fluid (See Abstract). The Inushima Patent discloses that the diamond film is heated by the heating element in quite a short time of about 0.2 second, that the resulting response characteristics of the diamond film are detected by the thermistor, and that the flow rate is calculated from the response characteristics (See Abstract).

As admitted by the Examiner (Office Action, dated April 27, 2007, at 2, lines 13-24), the Inushima Patent does not teach, or suggest, (i) a “corrosion resistant metal substrate” and (ii) a “sensor base equipped with the sensor part installed thereupon” as recited by independent claims 1 and 17. However, this is not the only deficiency of the Inushima Patent. As also admitted by the Examiner (Office Action, dated April 27, 2007, at 2, lines 20-24), the Inushima Patent also does not teach, or suggest, (iii) an “insulation film” and (iv) a “protection film” as recited by independent claim 1 and dependent claim 10. As further admitted by the Examiner (Office Action, dated April 27, 2007, at 3, lines 1-4), the Inushima Patent also does not teach, or suggest, (v) “strain applied to the sensor part when fastening the metal gasket to the sensor base is suppressed by a stiffness of material of the sensor base against which the metal gasket fastens to secure hermeticity between the sensor base and the body” as recited by dependent claim 2 and independent claim 17. The Inushima Patent also does not teach, or suggest, the subject matter of new claims 18-22.

ii. The Nagata Patent

The Nagata Patent discloses a “diaphragm-type sensor,” as shown in Figures 3a and 3b, wherein the diaphragm-type sensor includes a substrate (21) including a cavity (22), a diaphragm (23) formed on the cavity (22) and supported by the substrate (21), a heater element (7) arranged on the diaphragm (23), two sensor elements (8), (9) arranged on both sides of the heater element (7) and slits (24r), (24l) between the heater element (7) and the respective sensor elements (9) and (8), (See Abstract of Nagata Patent, and col. 2, line 58, to col. 3, line 6). The Nagata Patent discloses that the slits (24r), (24l) are effective in completely preventing the deformation of the diaphragm (23) due to heat propagated from the heater element (7) from influencing the sensor elements (8), (9), which allows the diaphragm-type sensor to exhibit stable output characteristics (See Abstract). The Nagata Patent discloses that the substrate (21) may be a metal substrate (col. 30-34).

As admitted by the Examiner (Office Action, dated April 27, 2007, at 2, lines 15-24), the Nagata Patent does not teach, or suggest, (i) a “corrosion resistant metal substrate” as recited by independent claims 1 and 17. However, this is not the only deficiency of the Nagata Patent. As also admitted by the Examiner (Office Action, dated April 27, 2007, at 2, lines 20-24), the Nagata Patent also does not teach, or suggest, (ii) an “insulation film” and (iii) a “protection film” as recited by independent claim 1 and dependent claim 10. As further admitted by the Examiner (Office Action, dated April 27, 2007, at 3, lines 1-4), the Nagata Patent also does not teach, or suggest, (iv) “strain applied to the sensor part when fastening the metal gasket to the sensor base is suppressed by a stiffness of material of the sensor base against which the metal gasket fastens to secure hermeticity between the sensor base and the body” as recited by dependent claim 2 and independent claim 17. The Nagata Patent also does not teach, or suggest, the subject matter of new claims 18-22.

iii. The Azima Patent

The Azima Patent discloses “techniques for making and using a sensing assembly for a mass flow controller,” which includes providing separating terminals between windings on a sensor tube (See Abstract of the Azima Patent). The Azima Patent discloses that the separating terminals allow secure and reliable electrical connections to be made to wire wound on the sensor tube, and act as standoffs that support the sensor tube about an insulative form (See Abstract of the Azima Patent). As admitted by the Examiner (Office Action, dated April 27, 2007, at 3, lines 6-9), neither the Inushima Patent, the Nagata Patent, nor the Azima Patent teach, or suggest, the “metal gasket” recited by dependent claim 2 and independent claim 17.

iv. Multiple “Official Notices”

The Examiner makes multiple assertions regarding what is commonly known in the art. For example, the Examiner states that providing an insulating film or a protective film is “necessary to protect the components and the diaphragm of the sensor from [the] environment it will be used in” (Office Action, dated April 27, at 2, lines 21-22). The Examiner also states that “it is known in the art that a substrate may be welded or spot welded or soldered to the structure it needs to support on for stability” (Office Action, dated April 27, at 2, lines 23-24). The Examiner also states that “[i]t is inherent to provide a gasket when two elements are connected and that the fluid is being flown through it” (Office Action, dated April 27, 2007, at 3, lines 6-8).

To the extent that the Examiner is contending that the subject matter asserted is “well-known,” “basic knowledge” and/or “common sense,” Applicants’ object. The Examiner is reminded that the Administrative Procedure Act requires that the Examiner’s rejections

employ “reasoned decision making” based on evidence from a fully developed administrative record. In re Lee, 61 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 2002). Patentability determinations that are based on what the Examiner believes is “basic knowledge” and “common sense,” and that otherwise lacks substantial evidentiary support, are impermissible. In re Zurko, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001). Therefore, Applicants’ respectfully traverse the Examiner’s Section 103 rejection of independent claims 1 and 17 on the grounds that the multiple “Official Notices” lack “substantial evidentiary support.” Therefore, the Examiner must now adduce substantial evidentiary support (e.g., produce a prior art reference) with respect to the subject matter claimed and deemed to be “well-known,” “basic knowledge” or “common sense,” or withdraw the Section 103 rejection standing against claims 1 and 17.

v. Summary of the Disclosures

The Inushima Patent discloses an “electric device and method of driving the same,” which involves forming a thermistor layer made of platinum on a thin diamond film so that the amount of heat carried away from the diamond film by a fluid is detected as a change in the temperature of the thermistor layer. However, the Inushima Patent does not teach, or suggest, (i) a “corrosion resistant metal substrate” and (ii) a “sensor base equipped with the sensor part installed thereupon” as recited by independent claims 1 and 17; (iii) an “insulation film” and (iv) a “protection film” as recited by independent claim 1 and dependent claim 10; (v) “strain applied to the sensor part when fastening the metal gasket to the sensor base is suppressed by a stiffness of material of the sensor base against which the metal gasket fastens to secure hermeticity between the sensor base and the body” as recited by dependent claim 2 and independent claim 17; and (vi) the Inushima Patent also does not teach, or suggest, the subject matter of new claims 18-22.

The Nagata Patent discloses a “diaphragm-type sensor,” as shown in Figures 3a and 3b, wherein the diaphragm-type sensor includes a substrate (21) including a cavity (22), a diaphragm (23) formed on the cavity (22) and supported by the substrate (21), a heater element (7) arranged on the diaphragm (23), two sensor elements (8), (9) arranged on both sides of the heater element (7) and slits (24r), (24l) between the heater element (7) and the respective sensor elements (9) and (8). However, the Nagata Patent does not teach, or suggest, (i) a “corrosion resistant metal substrate” as recited by independent claims 1 and 17; (ii) an “insulation film” and (iii) a “protection film” as recited by independent claim 1 and dependent claim 10; (iv) “strain applied to the sensor part when fastening the metal gasket to the sensor base is suppressed by a stiffness of material of the sensor base against which the metal gasket fastens to secure hermeticity between the sensor base and the body” as recited by dependent claim 2 and independent claim 17. The Nagata Patent also does not teach, or suggest, the subject matter of new claims 18-22.

The Azima Patent discloses providing separating terminals between windings on a sensor tube so that the separating terminals allow secure and reliable electrical connections to be made to wire wound on the sensor tube, and to act as standoffs that support the sensor tube about an insulative form.

As admitted by the Examiner (Office Action, dated April 27, 2007, at 2, lines 21-24, and at 3, lines 6-8), the combination of Inushima, Nagata and Azima fails to teach, or suggest, an “insulation film” and a “protection film” as recited by claims 1 and 10; a “metal gasket fastened to the sensor base” as recited by claims 2 and 17; and the “corrosion resistant metal substrate is fastened hermetically to the sensor base by welding” as recited by claim 1. The Examiner employs multiple “Official Notices” to make up these deficiencies in the disclosures of the above references. However, the “Official Notices” have been timely traversed so the Examiner must now produce “substantial evidentiary support” (i.e., prior art

references) to substantiate the “Official Notices” or withdraw the Section 103 rejections based on the unsupported “Official Notices.”

Even if the Examiner substantiates all of the above “Official Notices,” the combination of the Inushima Patent, the Nagata Patent, the Azima Patent, and one or more additional documents yet to be produced by the Examiner in support of the “Official Notices,” would still fail to teach, or suggest, (i) a “corrosion resistant metal substrate” and (ii) a “sensor base equipped with the sensor part installed thereupon” as recited by independent claims 1 and 17; (iii) “strain applied to the sensor part when fastening the metal gasket to the sensor base is suppressed by a stiffness of material of the sensor base against which the metal gasket fastens to secure hermeticity between the sensor base and the body” as recited by dependent claim 2 and independent claim 17; and (iv) the subject matter of new claims 18-22.

vi. Examiner’s Improper Inherency Argument

The Examiner argues that “[i]t is inherent to provide a gasket when two elements are connected and that the fluid is being flown through it” (Office Action, dated April 27, 2007, at 3, lines 6-9, emphasis added). The Examiner’s “inherency” argument is untenable as a matter of law for multiple reasons. First, inherency applies to anticipation when a single reference is silent about an asserted inherent characteristic. Continental Can Co. USA Inc. v. Monsanto Co., 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991). Inherency is not a doctrine that applies to an asserted “inherent” characteristic of a hypothetical construct resulting from the combination of the disclosures of multiple references. Second, inherency cannot be established based on mere possibilities or probabilities, but must flow as the natural result of the operation taught by a sufficient disclosure of a single reference. Id.

In this case, the Examiner's "inherency" argument is untenable and must be withdrawn because it is based on asserted inherent characteristics of a hypothetical device resulting for the Examiner's combination of at least the Inushima Patent, the Nagata Patent, and the Azima Patent. The Examiner's "inherency" argument is additionally untenable because it is not based on the natural result of an otherwise sufficient single disclosure.

A person of ordinary skill in the art would know that not all, or even most, connections between two objects through which fluid flows are provided with a metal gasket. Thus, the Examiner's "inherency" argument is not the natural result flowing from a sufficient disclosure, but is merely speculation on the Examiner's part.

For all of the above reasons, the Examiner's "inherency" argument is untenable as a matter of law and as a matter of fact.

V. CONCLUSION

The Examiner has failed to establish a prima facie case of obviousness against Applicants' claimed invention because the combination of the Inushima Patent, the Nagata Patent, the Azima Patent does not teach, or even suggest, each and every limitation recited by the claims. Additionally, the Examiner's Section 103 rejection is grounded on multiple, unsupported "Official Notices," which Applicants have timely traversed. However, even if the Examiner were to provide "substantial evidentiary support" for the multiple "Official Notices," the combination of the Inushima Patent, the Nagata Patent, the Azima Patent, and the one or more additional reference yet to be cited by the Examiner in support of the "Official Notices" would still fail to teach, or suggest, (i) a "corrosion resistant metal substrate" and (ii) a "sensor base equipped with the sensor part installed thereupon" as recited by independent claims 1 and 17; (iii) "strain applied to the sensor part when fastening the metal gasket to the sensor base is suppressed by a stiffness of material of the sensor base"

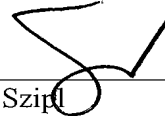
against which the metal gasket fastens to secure hermeticity between the sensor base and the body” as recited by dependent claim 2 and independent claim 17; and (iv) the subject matter of new claims 18-22.

For the above reasons, claims 1-3, 6, 7, 10 and 13-22 are in condition for allowance, and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below signed attorney for the Applicants.

Respectfully submitted,

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A handwritten signature in black ink, appearing to be 'Joerg-Uwe Szimpl', written over a horizontal line.

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